

CLAIMS

1. A method of manufacturing a hardfaced plate by applying a cladding to a surface of a substrate by arc welding, the method comprising moving the substrate and a continuous arc welding wire feed relative to each other, wherein the welding wire feed is in a direction generally transverse to said given direction of relative movement.

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2. A method according to claim 1, wherein the welding wire is fed by a welding gun to the surface of the substrate to be clad from one side of the given direction of relative movement at an acute angle to the surface of the substrate.

3. A method according to claim 1 or 2, wherein the cladding applied to the surface of the substrate is in the form of a continuous weld bead or a plurality of side-by-side weld beads.

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4. A method according to claim 3, wherein the profile(s) of the weld bead(s) is monitored.

5. A method according to claim 4, wherein said monitoring is carried out as part of a procedure to maintain a desired profile for the cladding.

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6. A method according to claim 4 or 5, wherein the so-monitored information is used to adjust at least one working parameter of the method.

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7. A method according to claim 6, wherein at least one of the welding current, arc voltage, relative welding gun and substrate speeds, gun angle and stickout distances is adjusted.

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8. A method according to any preceding claim, wherein the substrate is cylindrical and is rotated about a generally horizontal axis with respect to the welding wire feed.

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9. A method of manufacturing a hardfaced plate by applying a cladding to a surface of a substrate by arc welding, the method comprising moving the substrate and a continuous arc welding wire feed relative to each other in a given direction, wherein the welding wire feed is at an acute angle to that surface.

10. A method according to claim 9, wherein the welding wire feed is transverse of the given direction of relative movement.

11. A method according to claim 9 or 10, wherein the cladding applied to the surface of the substrate is in the form of a continuous weld bead or a plurality of side-by-side weld beads.

12. A method according to claim 11, wherein the profile(s) of the bead(s) is monitored.

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13. A method according to claim 12, wherein said monitoring is carried out as part of a procedure to maintain a desired profile for the cladding.

5 14. A method according to claim 12 or 13, wherein the so-monitored information is used to adjust at least one working parameter of the method.

15 15. A method according to claim 14, wherein at least one of the welding current, arc voltage, relative welding gun and substrate speeds, gun angle and stickout distances is adjusted.

16. A method according to any of claims 9 to 15, wherein the substrate is cylindrical and is rotated about a generally horizontal axis with respect to the welding wire feed.

17. A method of manufacturing a hardfaced plate by applying a cladding to a surface of a substrate by arc welding, which method comprises forming the substrate into a cylindrical shape, rotating the so-formed cylindrical substrate about a substantially horizontal axis, and applying continuous arc welding wire feed to the surface of the rotating substrate at a level below the uppermost level of the rotating cylindrical substrate.

18. A method according to claim 17, wherein welding wire is fed by a welding gun to the surface of the rotating substrate to be clad at an acute angle to that surface.

19. A method according to claim 17 or 18, wherein welding wire is fed to the substrate surface transversely to the direction in which the substrate is rotating.

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20. A method according to claim 17, 18 or 19, wherein the cladding applied to the surface of the rotating substrate is in the form of a continuous weld bead or plurality of side-by-side weld beads.

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21. A method according to claim 20, wherein the profile(s) of the bead(s) is monitored

22. A method according to claim 21, wherein said
15 monitoring is carried out as part of a procedure to maintain a desired profile for the cladding.

23. A method according to claim 21 or 22, wherein the monitored information is used to adjust at
20 least one working parameter of the method.

24. A method according to claim 23, wherein at least one of the welding current, arc voltage, relative welding gun and substrate speeds, gun angle
25 and stickout distances is adjusted.

25. Apparatus for manufacturing a hardfaced plate by applying a cladding to a surface of a substrate by arc welding, the apparatus comprising means arranged
30 to move a substrate and a continuous arc welding wire feed relative to each other and means arranged to direct the welding wire feed in a direction generally

transverse to said given direction of relative movement.

26. Apparatus according to claim 25, wherein
5 welding wire is arranged to be fed by a welding gun to the surface of the substrate to be clad from one side of the given direction of relative movement at an acute angle to the surface of the substrate.

10 27. Apparatus for manufacturing a hardfaced plate by applying a cladding to a surface of a substrate by arc welding, the apparatus comprising means arranged to move the substrate and a continuous arc welding wire feed relative to each other in a
15 given direction and means arranged to direct the welding wire feed at an acute angle to the substrate surface to be clad.

28. Apparatus according to claim 27, wherein
20 said welding wire feed directing means is arranged to direct the welding wire feed transversely of said given direction of relative movement.

29. Apparatus for manufacturing a hardfaced
25 plate by applying a cladding to a surface of a substrate by arc welding, which apparatus comprises rotatable means arranged to receive thereon a substrate to be clad, means for rotating the rotatable means, and hence a substrate received thereon, about a
30 generally horizontal axis, and means arranged to apply, in use, continuous arc welding wire feed to the

surface of the rotating substrate at a level below the uppermost region of the rotating substrate surface.

30. Apparatus according to claim 29, wherein welding wire is arranged to be fed by a welding gun to
5 the surface of the substrate to be clad from one side of the direction of rotation of the substrate in use.

31. Apparatus according to claim 30 including means arranged to feed welding wire at an acute angle
10 to the rotating substrate surface.

32. Apparatus according to claim 29, 30 or 31, wherein an arc welding gun is spaced from but movable across the surface of the substrate axially of the
15 rotating cylindrical substrate, in use.

33. Apparatus according to any of claims 25 to 32 including further means arranged to apply the cladding to the surface of the substrate in the form
20 of a continuous weld bead or a plurality of side-by-side weld beads.

34. Apparatus according to claim 33 including further means arranged to monitor the profile(s) of
25 the bead(s).

35. Apparatus according to claim 34 comprising additional means arranged to carry out said monitoring as part of a procedure to maintain a desired profile
30 for the cladding.

36. Apparatus according to claim 34 or 35 including further means for adjusting at least one working parameter of the method in dependence upon monitored information.

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37. Apparatus according to any of claims 25 to 36 including means arranged to oscillate the wire feed transversely to the direction of relative movement between the substrate surface and a or the welding
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